OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **GREGG LAKE** the program coordinators recommend the following actions. *We would like to encourage the association to conduct more sampling events in the future. With a limited amount of data it is difficult to determine water quality trends. Since weather patterns and activity in the watershed can change throughout the summer it is a good idea to sample the lake several times over the course of the season.*

FIGURE INTERPRETATION

- Figure 1: These graphs illustrate concentrations of chlorophyll-a in the water column. Algae are microscopic plants that are a natural part of lake ecosystems. Algae contain chlorophyll-a, a pigment necessary for photosynthesis. A measure of chlorophyll-a can indicate the abundance of algae in a lake. The historical data (the bottom graph) show a *slightly worsening* in-lake chlorophyll-a trend, which means concentrations have increased. *More than one test per season is necessary to accurately reflect the chlorophyll-a trends in the lake.* The greater the number of analyses, the greater the statistical significance of the trends. The concentration was below the mean for New Hampshire's lakes and ponds. The dominant algae this September were golden-browns and diatoms. While algae are present in all lakes, an excess amount of any type is not welcomed. Concentrations can increase when there are external and internal sources of phosphorus, which is the nutrient algae depend upon for growth. It's important to continue the education process and keep residents aware of the sources of phosphorus and how it influences lake quality.

- Figure 2: Water clarity is measured by using a Secchi disk. Clarity, or transparency, can be influenced by such things as algae, sediments from erosion, and natural colors of the water. The graphs on this page show historical and current year data. The lower graph shows a *fairly stable* trend in lake transparency. This year's reading was slightly below the mean for 1999, but again, this is with only one sampling event. The transparency remains above the mean value for NH lakes. The 2000 sampling season was considered to be wet and, therefore, average transparency readings are expected to be slightly lower than last year's readings. Higher amounts of rainfall usually

cause more eroding of sediments into the lake and streams, thus decreasing clarity.

- Figure 3: These figures show the amounts of phosphorus in the epilimnion (the upper layer in the lake) and the hypolimnion (the lower layer); the inset graphs show current year data. Phosphorus is the limiting nutrient for plants and algae in New Hampshire waters. Too much phosphorus in a lake can lead to increases in plant growth over time. These graphs show a *variable* trend for in-lake phosphorus levels. The hypolimnetic phosphorus result was slightly elevated, which may have been affected by the low dissolved oxygen readings in September (see the Other Comments section below). The epilimnetic concentration was below the state median, while the hypolimnetic was slightly above the median. One of the most important approaches to reducing phosphorus levels is educating the public. Humans introduce phosphorus to lakes by several means: fertilizing lawns, septic system failures, and detergents containing phosphates are just a few. Keeping the public aware of ways to reduce the input of phosphorus to lakes means less productivity in the lake. Contact the VLAP coordinator for tips on educating your lake residents or for ideas on testing your watershed for phosphorus inputs.

OTHER COMMENTS

- **Please note** the epilimnetic and Outlet phosphorus concentrations were reported as less than 5 µg/L. The NHDES Laboratory Services adopted a new method of analyzing total phosphorus this year and the lowest value that can be recorded is 'less than 5 µg/L'. We would like to remind the association that a reading of 5 µg/L is considered low for New Hampshire's waters.

- Conductivity levels remain very low in the Gregg Lake watershed (Table 6). While the hypolimnion and Inlet both had a slight increase this summer, the readings are not considered excessive.

- The dissolved oxygen levels in the bottom 4 meters were again low this year (Table 9). The process of decomposition in the sediments depletes dissolved oxygen on the bottom of thermally stratified lakes. As bacteria break down organic matter, they deplete oxygen in the water. When oxygen gets below 1 mg/L, phosphorus normally bound up in the sediments may be released into the water column, a process that is referred to as *internal loading*. Depleted oxygen in the hypolimnion usually occurs as the summer progresses. This explains the higher phosphorus in the hypolimnion (lower water layer) versus the epilimnion (upper layer). Since an internal source of phosphorus to the lake is present, limiting or eliminating external phosphorus sources in the lake's watershed is even more important for lake protection.

- *E. coli* originates in the intestines of warm-blooded animals (including humans) and is an indicator of associated and potentially harmful pathogens. The bacteria concentration was zero at the White Birch Beach (Table 12). If residents are concerned about septic system impacts, testing when the water table is high or after rains is best. Please consult the Other Monitoring Parameters section of the report for the current standards for *E. coli* in surface waters.

NOTES

- Monitor's Note (9/1/00): Inlet slow flow.

USEFUL RESOURCES

Guidelines for Redeveloping Shoreland Property, WD-BB-33, NHDES Fact Sheet. (603) 271-3503 or www.state.nh.us

Save Our Streams Handbook for Wetlands Conservation and Sustainability. (800) BUG-IWLA, or visit www.iwla.org

Lake Protection Tips: Some Do's and Don'ts for Maintaining Healthy Lakes, WD-BB-9, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Septic Systems and Your Lake's Water Quality, WD-BB-11, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

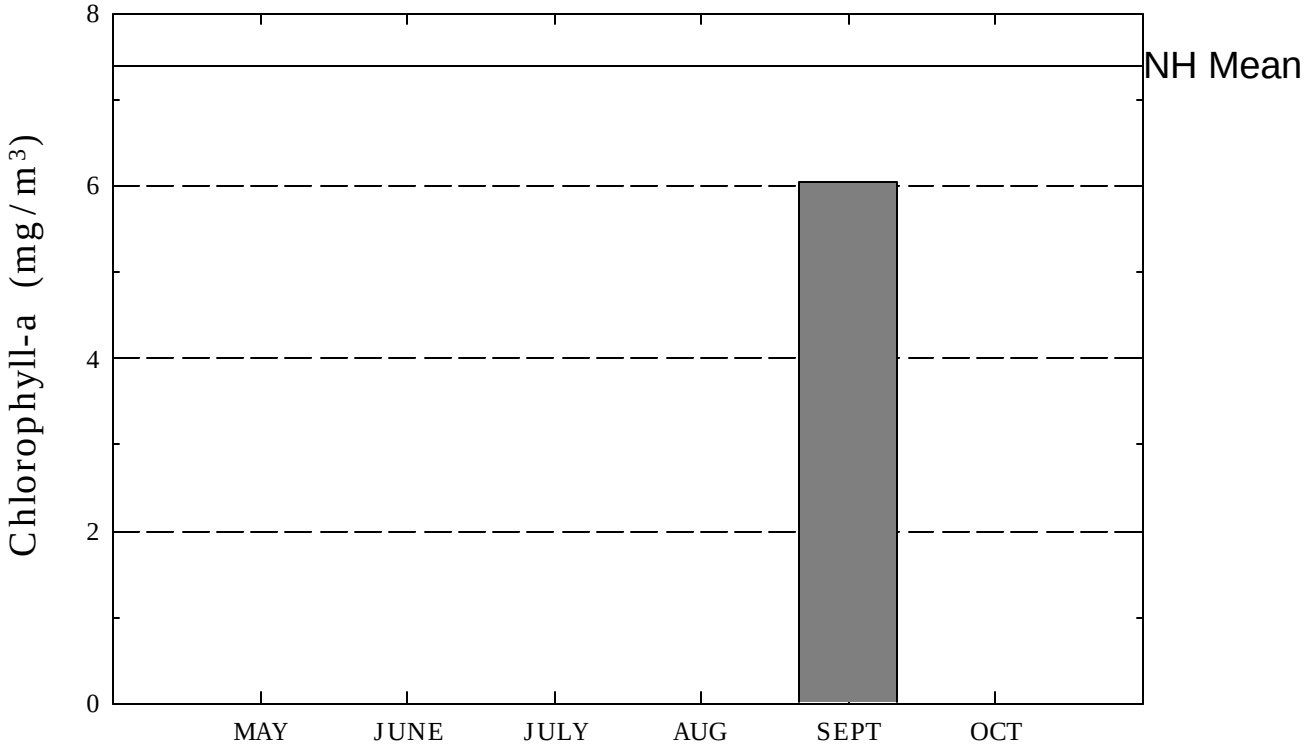
Anthropogenic Phosphorus and New Hampshire Waterbodies, NHDES-WSPCD-95-6, NHDES Booklet, (603) 271-3503

Vegetated Shoreline Buffers, video, North Country RC&D, (603) 527-2093

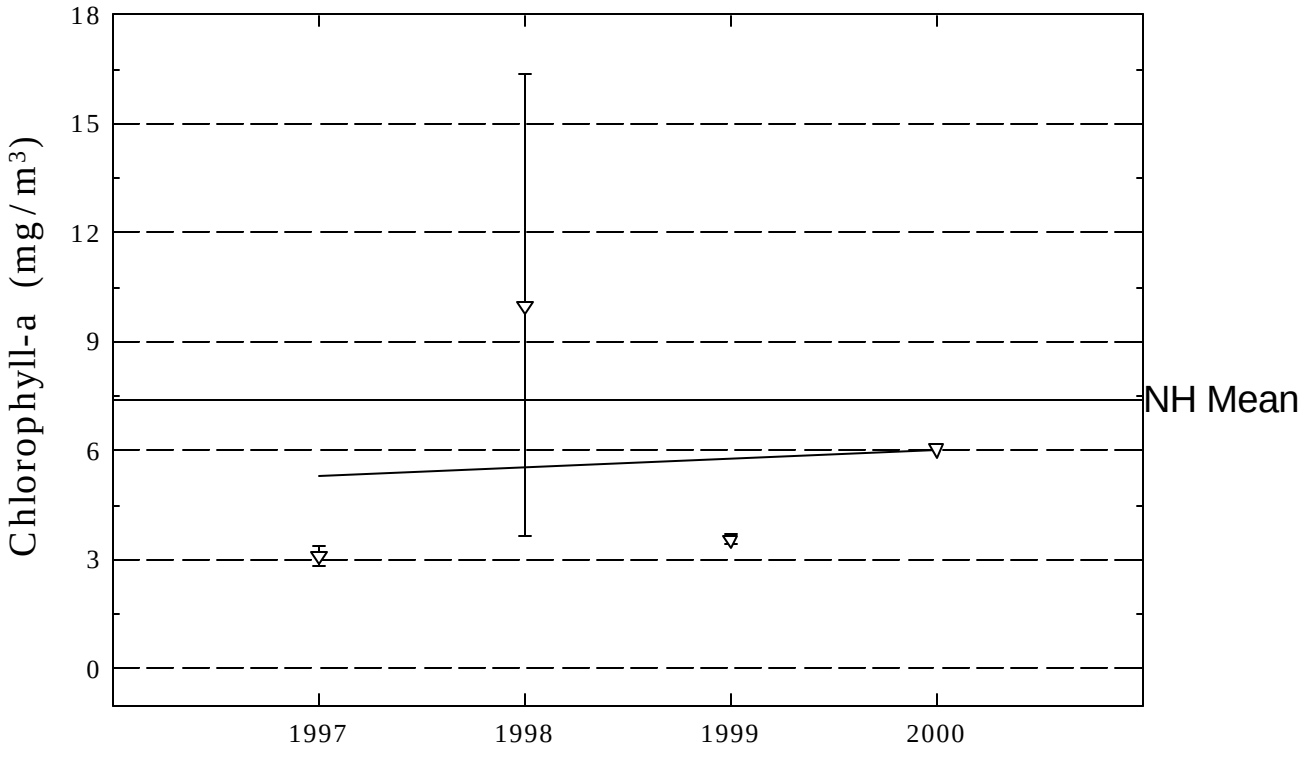
What is a Watershed?, NH Lakes Association pamphlet, (603) 226-0299 or www.nhlakes.org

Gregg Lake

Figure 1. Monthly and Historical Chlorophyll-a Results



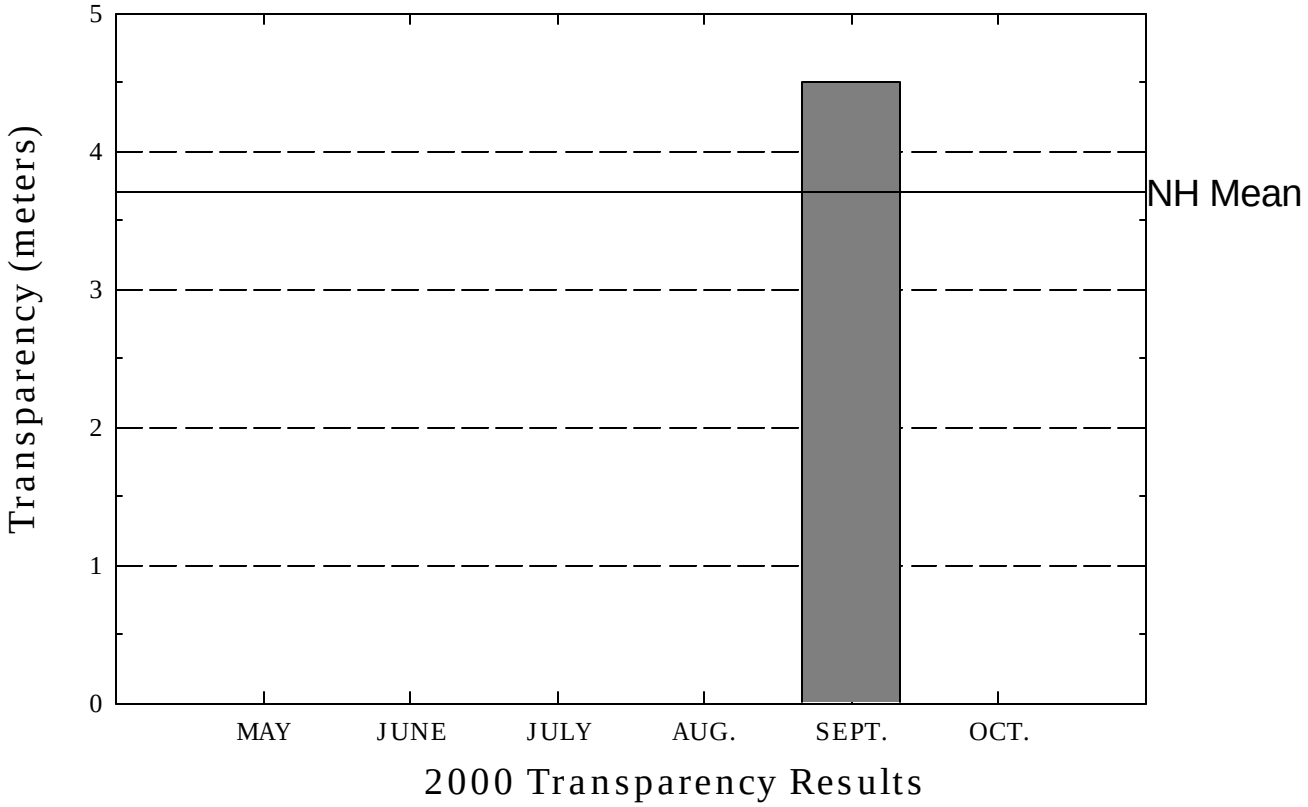
2000 Chlorophyll-a Results

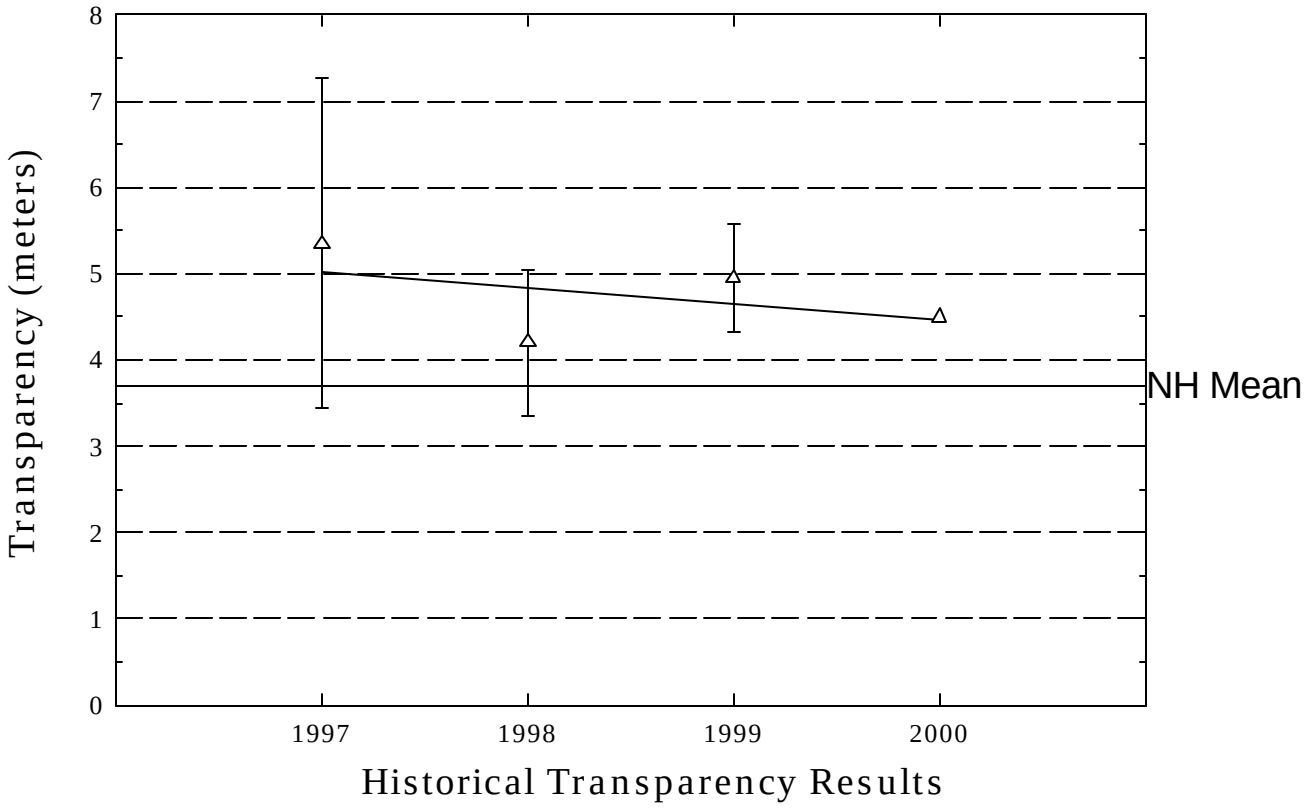


Historical Chlorophyll-a Results

Gregg Lake

Figure 2. Monthly and Historical Transparency Results





Gregg Lake

Figure 3. Monthly and Historical Total Phosphorus Data.

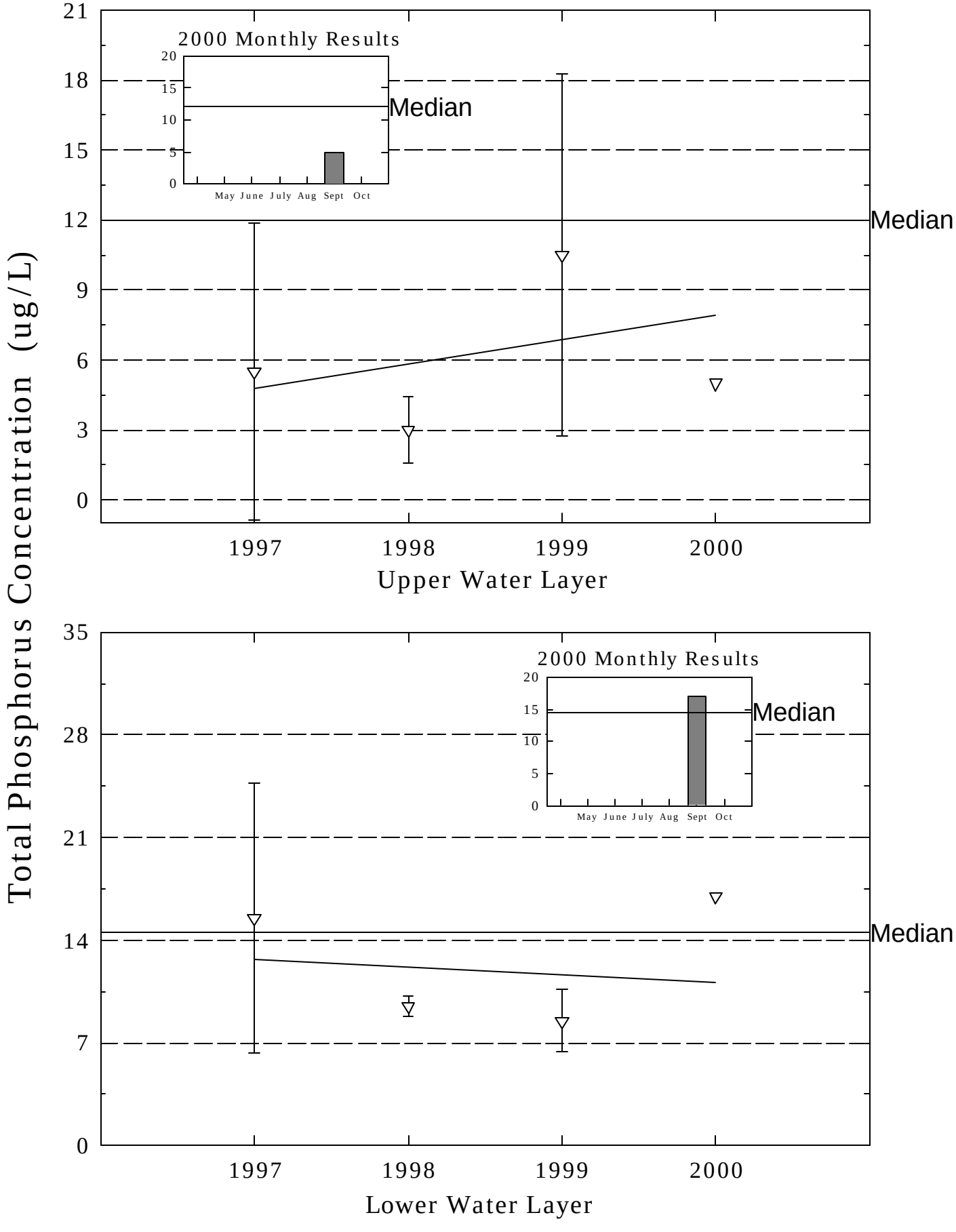


Table 1.

GREGG LAKE

ANTRIM

Chlorophyll-a results (mg/m^3) for current year and historical sampling periods.

Year	Minimum	Maximum	Mean
1997	2.92	3.29	3.10
1998	5.50	14.51	10.00
1999	3.46	3.65	3.55
2000	6.05	6.05	6.05

Table 2.

GREGG LAKE

ANTRIM

Phytoplankton species and relative percent abundance.

Summary for current and historical sampling seasons.

Date of Sample	Species Observed	Relative % Abundance
07 / 07 / 1997	ASTERIONELLA	28
	TABELLARIA	23
	PERIDINIUM	12
07 / 17 / 1998	CHRYSOSPHAERELLA	92
	ASTERIONELLA	4
	TABELLARIA	2
08 / 19 / 1999	TABELLARIA	28
	CHRYSOSPHAERELLA	17
	SYNEDRA	16
09 / 01 / 2000	RHIZOSOLENIA	46
	CHRYSOSPHAERELLA	32
	ASTERIONELLA	9

Table 3.

GREGG LAKE

ANTRIM

Summary of current and historical Secchi Disk transparency results (in meters).

Year	Minimum	Maximum	Mean
1997	4.0	6.7	5.3
1998	3.6	4.8	4.2
1999	4.5	5.4	4.9
2000	4.5	4.5	4.5

Table 4.

GREGG LAKE

ANTRIM

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1997	6.52	6.52	6.52
	1998	6.19	6.35	6.26
	1999	6.38	6.91	6.57
	2000	6.39	6.39	6.39
HYPOLIMNION				
	1997	5.70	5.70	5.70
	1998	5.76	5.91	5.83
	1999	5.76	5.79	5.77
	2000	6.15	6.15	6.15
INLET				
	1997	5.93	5.93	5.93
	1998	5.66	5.73	5.69
	1999	5.77	5.77	5.77
	2000	5.99	5.99	5.99
METALIMNION				
	1997	6.17	6.17	6.17
	1998	5.55	6.05	5.73
	1999	6.20	6.20	6.20
	2000	5.75	5.75	5.75
OUTLET				
	1997	6.30	6.30	6.30
	1998	6.18	6.25	6.21
	1999	6.36	6.44	6.40

Table 4.

GREGG LAKE

ANTRIM

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
	2000	6.34	6.34	6.34

Table 5.

GREGG LAKE

ANTRIM

Summary of current and historical Acid Neutralizing Capacity.
Values expressed in mg/L as CaCO .

Epilimnetic Values

Year	Minimum	Maximum	Mean
1997	1.90	1.90	1.90
1998	1.40	3.40	2.40
1999	1.70	2.10	1.90
2000	2.00	2.00	2.00

Table 6.

GREGG LAKE

ANTRIM

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1997	24.4	24.4	24.4
	1998	20.9	22.7	21.8
	1999	28.3	28.7	28.5
	2000	24.3	24.3	24.3
HYPOLIMNION				
	1997	25.5	25.5	25.5
	1998	31.0	33.6	32.3
	1999	30.1	30.8	30.4
	2000	39.9	39.9	39.9
INLET				
	1997	23.1	23.1	23.1
	1998	15.1	21.1	18.1
	1999	18.5	18.5	18.5
	2000	22.1	22.1	22.1
METALIMNION				
	1997	23.7	23.7	23.7
	1998	22.7	23.0	22.8
	1999	28.1	28.1	28.1
	2000	26.3	26.3	26.3
OUTLET				
	1997	25.6	25.6	25.6
	1998	21.9	23.4	22.7
	1999	28.0	29.0	28.5
	2000	24.6	24.6	24.6

Table 8.

GREGG LAKE

ANTRIM

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1997	1	10	5
	1998	2	4	3
	1999	5	16	10
	2000	< 5	5	5
HYPOLIMNION				
	1997	9	22	15
	1998	9	10	9
	1999	7	10	8
	2000	17	17	17
INLET				
	1997	7	27	17
	1998	10	20	15
	1999	18	18	18
	2000	10	10	10
METALIMNION				
	1997	2	18	10
	1998	3	6	4
	1999	6	6	6
	2000	5	5	5
OUTLET				
	1997	1	14	7
	1998	4	4	4
	1999	2	5	3
	2000	< 5	5	5

Table 9.

GREGG LAKE

ANTRIM

Current year dissolved oxygen and temperature data.

Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
		September 1, 2000	
0.1	24.7	8.1	97.6
1.0	23.2	8.3	96.8
2.0	22.9	8.1	93.8
3.0	22.6	8.1	93.7
4.0	21.4	8.6	97.3
5.0	19.6	5.3	58.2
6.0	17.5	0.8	7.9
7.0	14.8	0.5	5.2
8.0	12.4	0.6	5.7
9.0	10.7	0.7	6.0
9.5	10.6	0.7	6.5

Table 10.

GREGG LAKE

ANTRIM

Historic Hypolimnetic dissolved oxygen and temperature data.

Date	Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
July 7, 1997	9.5	13.0	0.2	2.0
July 17, 1998	10.0	10.8	0.5	4.0
August 19, 1999	9.0	11.4	0.8	6.9
September 1, 2000	9.5	10.6	0.7	6.5

Table 11.

GREGG LAKE
ANTRIM

Summary of current year and historic turbidity sampling.
Results in NTU's.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1997	0.3	0.3	0.3
	1998	0.2	0.6	0.4
	1999	0.3	0.5	0.4
	2000	0.2	0.2	0.2
HYPOLIMNION				
	1997	0.4	0.4	0.4
	1998	0.7	2.2	1.4
	1999	0.6	0.7	0.6
	2000	1.1	1.1	1.1
INLET				
	1997	0.6	0.6	0.6
	1998	0.4	0.5	0.4
	1999	0.7	0.7	0.7
	2000	0.3	0.3	0.3
METALIMNION				
	1997	0.4	0.4	0.4
	1998	0.3	0.5	0.4
	1999	0.5	0.5	0.5
	2000	0.4	0.4	0.4
OUTLET				
	1997	0.2	0.2	0.2
	1998	0.2	0.3	0.2
	1999	0.3	0.4	0.4
	2000	0.3	0.3	0.3

Table 12.

GREGG LAKE

ANTRIM

Summary of current year bacteria sampling.
Results in counts per 100ml.

Location	Date	E. Coli See Note Below
WHITE BIRCH BEACH		
	September 1	0

NOTE: "<" means "less than" and ">" means "greater than"